EIZO

Digital
Mammography
Monitors

Digital Mammography Monitors

Film Imaging to Digital Imaging for Mammography Diagnosis

As the incidence of breast cancer rises,
regular mammograms are recommended for early detection.

It is vital in the process of early breast cancer detection
to find subtle masses and calcifications.
Film imaging for mammography diagnosis has long been the primary methodology.

However, to meet the demand for a higher quality of images and
reduction of reading time and cost, digitizing and networking of medical images
in a filmless environment is spreading rapidly.

The transition from film to filmless mammography naturally requires
a monitor to display extremely precise images equal to
or better than film mammography.

In the mammography field today
high-performance monitors featuring high resolutions and displaying high density images
contribute to the process of early breast cancer detection.

Digital Mammography Requires a High-Performance Monitor

Digital Mammography Monitors

Selecting the Optimum Digital Mammography Monitor

Requirement 1

High-Resolution
High resolutions are required to display the correct "information volume" of a digital mammography image.

Requirement 2

High-Definition & High-Density
For the detection of mammary gland disorders which appear as "distortion," the monitor needs this required performance in order to display the subtle structures.

Requirement 3

Multi-Grayscale
For the detection of small tumors which appear as delicate "density" differences, the monitor needs the correct display of extremely subtle grayscale shadings.
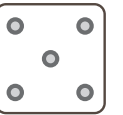
Requirement 4

Image Sharpness
For detection of subtle masses and calcifications, the monitor needs to display the outlines of the images with a high degree of sharpness.

Requirement 5

Brightness Uniformity
For correct luminance display of delicate "density" differences, the monitor needs uniformity in brightness across the entire screen.

Requirement 6

DICOM Part 14 Compliance with Quality Control Software
For unified image display between multiple monitors, the monitor is required to adjust the characteristics to the grayscale standard DICOM Part 14 through calibration.

Requirement 7

Simple Quality Control Procedures
Quality characteristics gradually change over time and therefore in order to maintain a consistent display, the monitor needs to be quality-controllable.
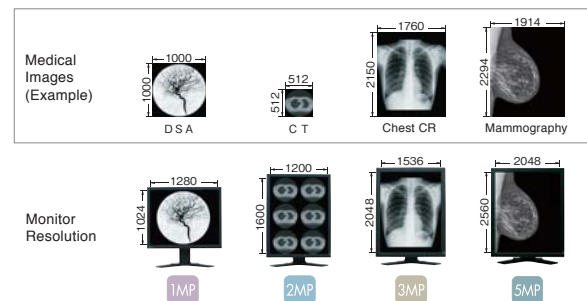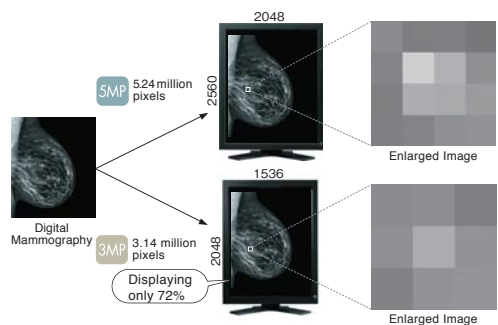
5MP MONOCHROME LCD MONITOR RadiForce® GS520

Featuring high-resolution, high-definition and multi-grayscale, the RadiForce GS520 is designed specifically for digital mammography with a choice of distinctive glare panel to meet diversified environment usage.

High-Resolution for Delicate Grayscale Shadings

When selecting a monitor, it's important to consider the "information volume" of the medical images to be displayed.


Medical Images (Example)	1000 / 1000 D S A	512 / 512 C T	1760 / 2150 Chest CR	1914 / 2294 Mammography
Monitor Resolution	1280 / 1024 1MP	1200 / 1600 2MP	1536 / 2048 3MP	2048 / 2560 5MP

Requirement 1

"Information volume" of a digital mammography image should exceed 5 million pixels. When a lower resolution monitor displays this "information volume," the monitor stretches the information forcing the mosaic to appear as shadings. With a 2048 x 2560 resolution or 5.24 million pixels, the stretching effect is minimized and the mosaic becomes suitable for rendering subtle masses and calcifications, within the mammography image.

5MP 5.24 million pixels — 2048 x 2560 — Enlarged Image

Digital Mammography

3MP 3.14 million pixels — 1536 x 2048 — Displaying only 72% — Enlarged Image

## High-Definition and High-Density with Minute Pixels

Requirement 2

0.165mm pixel size is the smallest pixel size among current EIZO medical monitors providing high-definition and high-density display without shadings appearing granular.

2MP 0.249 mm | 3MP 0.207 mm | 5MP 0.165 mm

Pixel Size Comparison
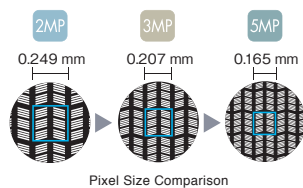
12 12-Bit Simultaneous Grayscale Display

Requirement 3

Along with EIZO's new frame rate control technology (patent pending), 4,096 (12-bit) grayscale tones can be displayed simultaneously from an abundant palette of 13,771 tones for high-definition digital mammography.
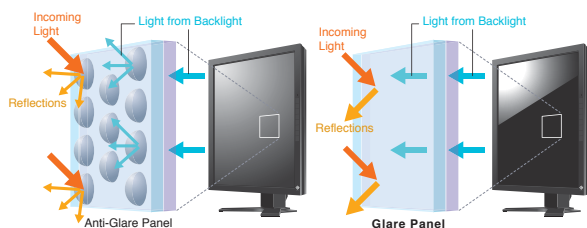
12-bit graphics board and 12-bit viewer software needed for 12-bit display.

8bit — 256 Tones Image | 4,096 Tones Image — 12bit
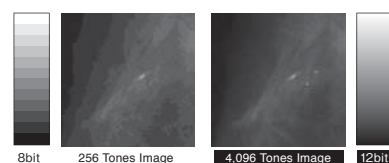
GLARE PANEL Distinctive Glare Panel

Many current monitors use anti-glare panels, which have a waffled surface to diffuse the reflection of surrounding light. However, this also diffuses the light from the monitor's backlight, which affects the outline of an image, causing a viewing strain on the observer. With a distinctive glare panel, there is no diffused reflection by the waffled surface, and the outline of the image is displayed more clearly. Therefore, the subtle images such as calcification and masses will be easier to observe reducing the strain on the observer.

Please note that the reflection of surrounding light may increase when used in a bright environment. Available with either a glare panel (GS520-CLG, GS520-BLG) or anti-glare panel (GS520-CL, GS520-BL).
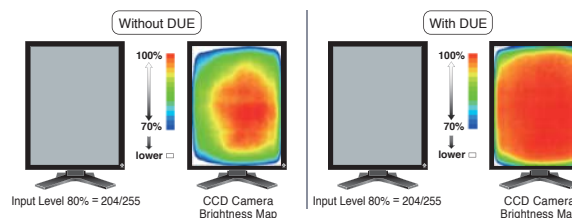

Incoming Light — Light from Backlight — Reflections — Anti-Glare Panel

Incoming Light — Light from Backlight — Reflections — Glare Panel

Sharper Resolution for Clearer Image Outline

Requirement 4

MTF (Modulation Transfer Function) is a parameter to define the display sharpness and resolution of a monitor panel. The glare panel has better MTF characteristics than the anti-glare panel meaning the glare panel can be expected to display the outline of a detailed image more sharply.
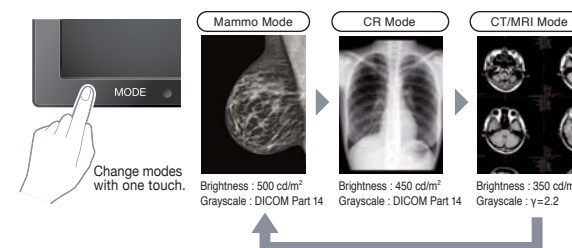

Provided by Anjo Kosei Hospital

- Glare Panel
- Anti-Glare Panel

MTF vs Spatial Frequency (Line pairs/mm)
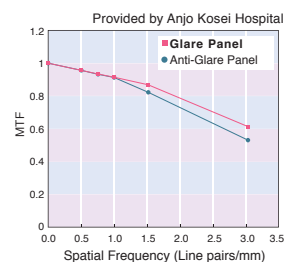
DUE DUE for Brightness Uniformity

Requirement 5

To sustain image consistency, brightness uniformity is required for medical imaging monitors. However, unified luminance of the backlight is difficult to attain due to the characteristics of LCD monitors. The Digital Uniformity Equalizer (DUE) function provides optimum backlight luminance uniformity.

Without DUE — Input Level 80% = 204/255 — CCD Camera Brightness Map

With DUE — Input Level 80% = 204/255 — CCD Camera Brightness Map
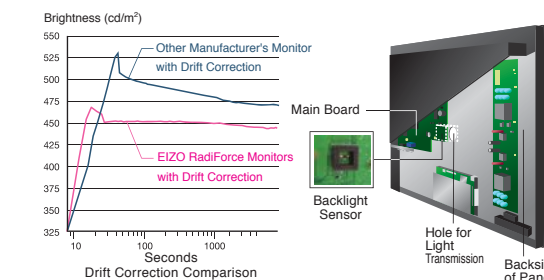
CAL SWITCH Calibration Mode Selection

Selectable with the front panel buttons, the CAL Switch function allows for various calibration modes of different modalities such as digital mammography, CR, and CT images. Furthermore, with ScreenManager Pro for Medical installed, auto mode settings can be made with the Auto CAL Switch function.

MODE — Change modes with one touch.

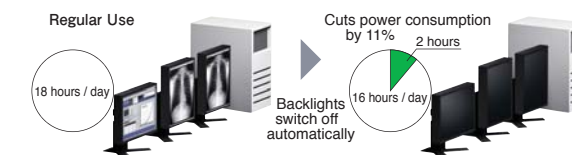| Mammo Mode	CR Mode	CT/MRI Mode
Brightness : 500 cd/m² Grayscale : DICOM Part 14	Brightness : 450 cd/m² Grayscale : DICOM Part 14	Brightness : 350 cd/m² Grayscale : γ=2.2

Brightness Stabilization

At startup or upon wakeup, the EIZO patented drift correction function quickly stabilizes the brightness level. In addition, a sensor measures the backlight brightness and compensates for brightness fluctuations caused by the ambient temperature and the passage of time.

This brightness stabilization function is EIZO patented technology (Japan patent numbers 3171808 and 3193315, US patent number 6188380).

Brightness (cd/m²) vs Seconds — Drift Correction Comparison

Other Manufacturer's Monitor with Drift Correction — EIZO RadiForce Monitors with Drift Correction — Main Board — Backlight Sensor — Hole for Light Transmission — Backside of Panel

Backlight Saver

With ScreenManager Pro for Medical utility software installed, the Backlight Saver function allows for the monitor's backlight to turn off when the screen saver is activated and the monitor's backlight to turn on when the computer comes out of the screen saver mode. This function helps to reduce power consumption when the monitor is used for a prolonged period of time.

Regular Use — 18 hours / day — Cuts power consumption by 11% — 2 hours — Backlights switch off automatically — 16 hours / day

Compatibility with Various Graphics Boards

Supports various input signals for compatibility with a wide range of graphics boards so the user can select the board according to budget and performance requirements. This includes single link and dual link signals, as well as packed-pixel signal for users requiring 12-bit or 10-bit simultaneous display.
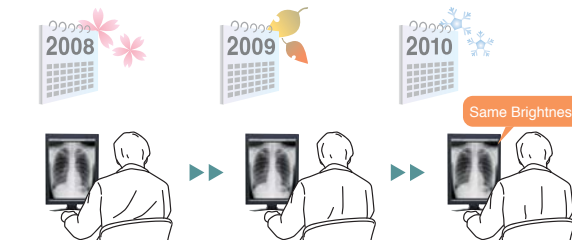

5 Full 5-Year Warranty

EIZO and its authorized distributors offer a five-year limited warranty for RadiForce GS520.

5 Year Warranty 5

Brightness Stability Within Usage Time Guaranteed

EIZO's confidence in its product quality extends to brightness stability which is also covered during the usage time specified in the warranty.

2008 — 2009 — 2010 — Same Brightness!
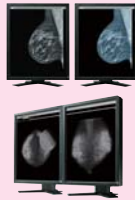
Displaying the Optimum Digital Mammography Image ■ ■ ■

EIZO offers all the necessary components for correct digital mammography image display.

Digital Mammography Monitor

GS520

`CL` `BL` ● An option of clear base and blue base backlights are available.

● Paired monitors which provides the same color and grayscale for two monitors bundled as a pair in one box, also available.

Standard Configuration

Quality Control Sensor

Clip-On Swing Sensor G1

Requirement 7 Once attached to the top of the monitor the Clip-On Swing Sensor G1 can remain in place and is ready for use. This saves the time and trouble of attaching and removing it when performing quality control tasks.
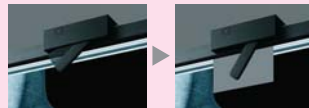
Quality Control Tool

RadiCS™ UX1

Requirement 6 EIZO's easy-to-use RadiCS quality control software performs precise calibration conforming to DICOM Part 14 and enables quality control complying with ACR Practice Guideline and other QC standard for digital mammography monitors.

High-Performance Graphics Board

Four options are available:

	VREngine/SMD5-PCI	MED5mp-PPP	FireGL V7350	FireMV 2250
Bit	12-bit /10-bit / 8-bit	10-bit / 8-bit	8-bit	8-bit
Compatible Operating System	Windows XP / 2000 Professional	Windows XP / 2000 Professional	Windows XP	Windows XP
Frame Buffer Memory	128 MB	256 MB	1 GB	256 MB
Bus Interface	PCI 32-bit (33 MHz / 66 MHz)	PCI 32-bit (33 MHz) / 64-bit (66 MHz)	PCI Express x 16	PCI Express x 16 / x 1
Maximum Disply Resolutions	2048 x 2560	2048 x 2560	2048 x 2560	2048 x 2560
Output Terminals	DVI-I x 2	DVI-I x 2	DVI-D x 2	DVI-D x 2
Dot Clock	Up to 148 MHz	Up to 148 MHz	214.25 MHz	162 MHz
Scanning Frequency (H, V)	103.9 kHz	103.9 kHz	131 kHz	75 kHz
	50 Hz	50 Hz	50 Hz	60 Hz
Maximum Power Consumption	16.8 watts	40 watts	75 watts	22 watts

Accessories

Dual Height Adjustable Stand

LS-HM1-D

Mount two panels in either portrait or landscape orientation.
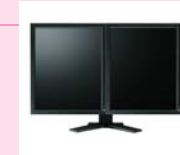
Panel Protector

RP-901

Protect against scratches and dust with high light transmission panel.

Monitor Cleaning Kit

ScreenCleaner™

Keep your screen free from dust and fingerprints with this screen cleaner kit. Includes pump spray and cloth. (Bundled with GS520-CLG and GS520-BLG.)

Quality Control of Digital Mammography Monitor

As with the use of film mammography, image quality testing of the monitor at installation and regularly during use should be carried out. This ensures that the monitor maintains a consistent display of quality digital mammography.
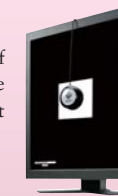
■ ACR "Practice Guideline for Determinants of Image Quality in Digital Mammography"
A guideline established by the American College of Radiology (ACR) in cooperation with the American Association of Physicists in Medicine (AAPM), Radiological Society of North America (RSNA), and Society for Imaging Informatics in Medicine (SIIM).
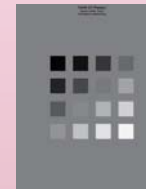
■ EUREF "European Guidelines for Quality Assurance in Breast Cancer Screening and Diagnosis"
A standard issued by the European Commission in cooperation with the European Reference Organization for Quality Assured Breast Screening and Diagnostic Services (EUREF), and European Breast Cancer Network (EBCN), European Society of Mastology (EUSOMA).
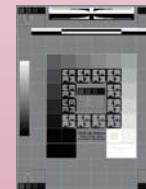
■ PAS 1054
"Requirements and Testing of Digital Mammography Equipment" established by the Normenausschusses Radiologie (DIN NAR) in cooperation with the Deutschen Röntgengesellschaft (DRG) and others. In line with the QS-RL (Qualitätssicherungs-Richtlinie) quality assurance ordinance, it is mandatory in Germany to refer to this standard when conducting monitor quality assurance.
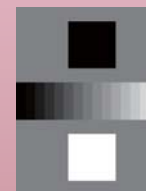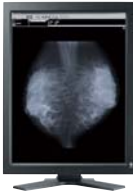
5MP

GS520
54 cm 21.3"
Monochrome LCD Monitor

12 bit | DUE | 5

Model Variations	GS520-CLG: Clear Base with Glare Panel GS520-BLG: Blue Base with Glare Panel GS520-CL: Clear Base GS520-BL: Blue Base
Cabinet Color	Black
Panel	TFT Monochrome LCD Panel (IPS)
Active Display Size (H x V)	337.9 x 422.4 mm
Viewable Image Size	Diagonal: 540 mm
Native Resolution	2048 x 2560
Pixel Pitch	0.165 x 0.165 mm
Grayscale Tones	4,096 from a palette of 13,771 tones
Viewing Angles (H, V)	170°, 170°
Brightness	700 cd/m^2 (typical)
Recommended Brightness for Calibration	500 cd/m^2
Contrast Ratio	800:1 (typical)
Response Time	100 ms (typical)
Scanning Frequency (H, V)	31-135 kHz, 19-51 Hz Frame synchronous mode: 49 - 51 Hz
Dot Clock	300 MHz
Input Signals	DVI Standard 1.0
Input Terminal	DVI-D 24 pin
USB Ports	1 upstream, 2 downstream
USB Standard	Standard Rev. 2.0
Power Requirements	AC 100-120 V, 200-240 V: 50 / 60 Hz
Power Consumption	90 watts
Power Save Mode	Less than 1.2 watts
Sensor	Backlight Sensor
Power Management	DVI DMPM
OSD Languages	English, French, German, Italian, Japanese, Simplified Chinese, Spanish, Swedish, Traditional Chinese
Net Weight	With Stand: 9.6 kg Without Stand: 6.6 kg
Hole Spacing	VESA standard (100 x 100 mm)
Certifications and Standards	CE (Medical Device Directive), TÜV/GM (EN60601-1), cTÜVus (UL60601-1, CSA C22.2 No. 601-1), CB (IEC60601-1), VCCI-B, FCC-B, Canadian ICES-003-B, c-Tick, FDA 510(k) for Mammography and General Radiography, RoHS
Supplied Accessories	AC power cord, user's manual, signal cable (DVI-D ~ DVI-D), USB cable, EIZO LCD Utility Disk (RadiCS LE, ScreenManager Pro for Medical software), ScreenCleaner (GS520-CLG, GS520-BLG only), warranty card

Dimensions [Unit:mm]
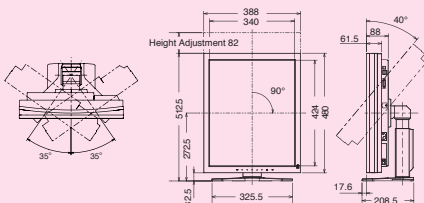
388
340
Height Adjustment 82
61.5 | 88
40°
90°
512.5
272.5
424
480
325.5
332.5
17.6
208.5
35° | 35°

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